ever took a holiday. He was at school at Cannes, and at that time the French took less interest in sports and games than they do now, so that he had none of that love for outdoor pursuits which is so characteristic of the average Englishman. He had no enemies, for everyone who knew him liked him for his kindliness and his extraordinary modesty, though, when the occasion arose, he could show great firmness and decision. He will long be remembered as a great man of science and a great gentleman. E. W. Marchant.

NOTES.

In its column entitled "Through German Eyes," the *Times* of November 13 gives prominence to notices appearing in German newspapers of further important steps now being taken to strengthen and consolidate the great dye syndicate, of which the seven largest firms control a capital of nearly 12,000,000*l.* The three largest undertakings in this group, namely, the Höchst colour works, the Badische Anilin- und Soda-Fabrik, and the Bäyer colour factories, are each to increase their capital from 2,700,000*l.* to 4,500,000*l.* These increases of capital, raised by the Rhenish firms themselves, will be supplemented by additional sums to be provided by the German Government, so that the total capital will be more than 20,000,000*l.* The German Press appreciates fully the prominent part played by chemical industry in the war, and attributes largely to this group of factories the extraordinary striking force displayed by Germany on the fields of battle. The intimate relationship between synthetic dyes and high explosives has slowly dawned on the British public, but it is deplorable that even after three years of war the English colour industry is in a position even more disorganised and chaotic than it was at the outbreak of hostilities. A beginning of co-ordination and co-operation in dye production has developed among the Lancashire firms, but the State-aided company which was to have united the colour trade and to have administered the research grant of 120,000*l.* for the benefit of all the manufacturers concerned, so far from effecting these vital improvements, has actually been the direct exciting cause of additional friction and needless internal competition. Now that public appeals are being made for more Government support for this company it is surely time that a non-political, impartial Parliamentary inquiry should be set on foot to ascertain how the earlier grants have been expended, and whether the existing organisation is adequate to meet the competition of a powerful enemy syndicate operating under expert and scientific management.

In a speech delivered on November 8 the President of the Board of Agriculture again directed public attention to the gravity of the food outlook, and outlined clearly the concatenation of circumstances which render it inevitable that even the establishment of peace cannot bring automatically the proverbially associated plenty. Of special interest was Mr. Prothero's warning that the productive power of the soil of Europe is falling. Not only have large cultivated areas become desolate wastes through the direct ravages of warfare, but even regions remote from the firing line are losing their fertility for want of labour and fertilisers. That is true of Germany; it is also true of areas in this country. Mr. Prothero pointed out that the yield per acre fell in 1916; it has fallen still further in 1917, and, so far as existing areas go, will almost certainly undergo a further decrease. On broad general grounds this prediction is doubtless reasonably probable, but statisticians will scarcely regard the results of the last two seasons as a sufficient basis for such a broad generalisation, especially as these have been years in which natural conditions alone have notoriously been unfavourable to a heavy grain crop. The average yield of wheat per acre in England and Wales this year is estimated at 29·88 bushels, of barley at 30·36 bush., and of oats at 38·49 bush., as compared with 28·60 bush., 31·11 bush., and 39·95 bush. respectively in 1916, and averages of 31·40 bush., 32·44 bush., and 40·03 bush. respectively for the ten years 1907–16. These differences are well within the range of natural variations, and can scarcely be adduced as evidence of specific decline in fertility. It is certain, however, that the increasing foulness of the arable land owing to lack of adequate labour for the necessary cleaning operations must tend towards a reduction of crop. On the other hand, it is equally certain that an extended and more skilful use of fertilisers for corn crops would lead to an appreciable increase of the average yields. An instance in point is furnished by a report on oat manuring experiments recently issued by the West of Scotland Agricultural College, in which it is recorded that on the average of seventeen experiments in three years the oat yield of $41\frac{1}{4}$ bush. on the unmanured plot was increased fully 30 per cent. by the combined use of superphosphate, kainit, and sulphate of ammonia. The wheat crop offers probably less scope for intensive manuring, but undoubtedly is capable of very substantial improvement on many farms.

It was remarked in these columns, at the time of the establishment of the Air Board, that more co-ordination was needed between the various branches of the Air Services, and that the Air Board should do much to secure this end. The introduction of the Air Force Bill shows that the Government now intends to make such co-ordination complete by the establishment of an Air Council, which is to enjoy a status similar to that of the Admiralty and the Army Council. The *Times* remarks that this is a landmark in the history not only of aviation in this country, but also of the armed forces of the Crown; for it formally recognises the air as a distinctive fighting element, and provides for the establishment of a third service, to be called the Air Force. Those whose labours lie in the field of scientific aeronautical research will welcome the new *régime* as a step of great importance. A closer connection is very desirable between scientific work and practical aircraft design, and there seems little doubt that this end will be achieved much more rapidly if the present air services are organised as a single force and controlled by one central council. It is, indeed, a triumph for aviation that in only a few years of development it should rise to such importance as to cause the creation of a third Service, and it is pleasing to reflect that scientific research has played a very important part in this rapid development of the new industry.

A recent lecture delivered by Major Astor, M.P., on "Health Problems and a State Ministry of Health," at the Royal Institute of Public Health, was the third of a series of lectures and discussions on public health problems under war and after-war conditions. Not unnaturally, on this occasion, the bulk of what the speaker, and those who took part in the discussion, had to say related to the Ministry of Health, and Major Astor, having declared that the Local Government Board, and not the Insurance Commission, would form the best nucleus for a Health Ministry, there was a tendency on the part of other speakers to take sides. Amongst those who showed no inclination to declare in favour of any particular body was Mr. H. A. L. Fisher, President of the Board of Education, who presided over the meeting, and remarked, in the course of his speech, that though, as matters now stood, there was considerable possibility of overlapping, it did not of necessity follow that the system was bad. Before condemning it he desired first of all to learn whether or not it worked well or ill; whether or not it was economical, and if there was friction. With reference to this question, it may be pointed out that Lord Rhondda has stated that the Board of Education and the Local Government Board have had differences of opinion as to their respective shares in the work of child welfare, but that before he left the latter Board an agreement had been arrived at. Possibly it was because there had been an agreement that Mr. Fisher desired to be non-committal.

THE organisers of the meeting held to take steps to form a representative association of British chemists, held at the Manchester School of Technology on November 10, are to be congratulated on the result of their efforts. Seldom have chemists been brought together in such numbers, at least 500 being present. Much criticism was levelled at the Institute of Chemistry, which has hitherto been held to be too exclusive and not sufficiently representative of the rank and file. In justice to the institute, however, it was recognised by the speakers that it has done a great deal for chemists and has within recent times evinced a disposition, as a war measure, to open its doors to properly trained and qualified chemists on a more liberal basis within the limitations of its constitution. The Provisional Committee of the new association obtained the support of the meeting to the main objects, but it agreed to submit its scheme to the council of the Institute of Chemistry before proceeding to definite incorporation, on the understanding that the institute, which has been established for forty years, should be asked in the first place to adopt its aims. The chairman of the meeting, Dr. Rée, intimated that the Provisional Committees for Manchester and Birmingham have already had an informal conference with the representatives of the institute, and that the latter has expressed its sympathy with the general aims of the proposed association. A great deal depends on what constitutes a chemist, and much will yet depend on the extent of the training and qualifications regarded by the organisers as necessary to justify registration of a candidate under the scheme. The meeting showed no disposition to claim that pharmaceutical chemists, many of whom are held to be sound chemists in the technical and technological sense, should be deprived of their right to the title. The meeting showed a healthy sign of activity among chemists, and it should produce far-reaching results. We trust that the Institute of Chemistry will welcome the opportunity of developing its sphere of usefulness. There is much to be considered and much to be done yet to secure for British chemists the position and recognition to which by their work they are clearly entitled.

THE death is announced, while leading his platoon during one of the recent advances in France, of 2nd Lieut. F. Entwistle, second assistant at the Observatory, Cambridge, aged twenty-one years. Mr. Entwistle was a computer at the Royal Observatory, Greenwich, and he went to Cambridge as second assistant in December, 1914. He was there a few months only before he was given a commission in the Norfolk Regiment as 2nd Lieutenant. Mr. Hartley, first assistant at the Cambridge Observatory, was killed on the *Vanguard* on July 9. The double tragedy exhausts the staff of the observatory, as distinct from the Solar Physics Observatory, except for the director.

MR. F. N. HAWARD, writing from 95 Uxbridge Road, Ealing, W.5, points out that the late Mr. Worthington G. Smith, whose work was referred to in NATURE of November 8, p. 191, was not only a botanist, but had also a world-wide reputation as an antiquarian. "W. G. S. was one of the most practical authorities in matters relating to prehistoric man, of whose implements of flint he made many discoveries of great importance. Besides being the author and illustrator of such a classic as 'Man, the Primeval Savage' (1894), he contributed largely and wisely to the current literature of the subject, and, being an expert engraver, he illustrated many of the works of his contemporaries on various scientific matters."

MR. J. A. HARDCASTLE, whose death on November 10 we much regret to record, was a grandson of Sir John Herschel, and himself a very capable astronomer in the fourth generation of that illustrious race of scientific men. Always a man of delicate health, and obliged in early manhood to winter abroad, he had been able by care and courage to carry through several important pieces of work in the intervals of illness, and the friends who had the privilege of knowing him recognised how considerable a share of the family talent was his. About fourteen years ago he undertook the measurement for the late Mr. S. A. Saunder of a series of lunar negatives from the Paris and Yerkes Observatories, which formed the observational basis of the now classic catalogue of precise positions on the moon's surface. Never, perhaps, in the history of observational astronomy has there been a more striking improvement on previous results than was shown in this work, and Mr. Saunder was always insistent on giving to Mr. Hardcastle a large part of the credit for his remarkable skill and judgment in a difficult task. A second large piece of work that he carried to a successful end was the examination and classification of the nebulæ on the 210 plates of the Franklin-Adams photographic chart of the whole sky, the results of which are published in the Monthly Notices of the Royal Astronomical Society for June, 1914. This has the unique merit that it is the only examination of the nebulæ of the whole sky made with the same instrument and of approximately uniform standard. For a number of years Mr. Hardcastle was a very successful University Extension lecturer in astronomy; he had served as secretary of the British Astronomical Association, and as member of council of the Royal Astronomical Society. A few months ago he was appointed to succeed Dr. Dreyer as director of the Armagh Observatory, and was looking forward with the keenest pleasure to the enjoyment of better health and the responsibilities of an official post, when a return of illness disappointed his hopes, and he died after much suffering at the early age of forty-nine.

THE Royal Geographical Society has sustained a deplorable loss in the death of one of its most active and most valued supporters, Brig.-Gen. Cecil Rawling, C.M.G., one of the gold medallists of the society this year. Many famous names are to be found in the list of soldier-geographers who have made exploration the one great objective of their lives, but there is not one which recalls a personality more inspired with high ideals or better endowed with all those qualities of mind and body which are the necessary outfit for the true explorer than Rawling. His best contributions to geographical science were gathered in Tibetan fields. He was there responsible for the results of an expedition in 1897–98 which added considerably to our knowledge of about 40,000 square miles of that inhospitable country. Such an experience fitted him well for the leadership of a subsequent expedition which was planned, after the Tibetan campaign under Sir F. Younghusband, for the determination of the sources of the Brahmaputra and Indus. Col. Ryder was attached to the expedition as surveyor, and brought back excellent mapping of the wild districts bordering the great Tibetan high road between Gartok and Lhassa, but the success of the expedition was doubtless due to the remarkable capacity of its leader. Rawling's last expedition, to New Guinea, whilst it was not productive of all the geographical information which was anticipated, was nevertheless a most valuable pioneer exploration into an utterly unknown region, and proved to be of the highest interest to many collateral branches of science which depend on geographical discovery as their preliminary basis. It was fitting perhaps that a right good soldier and a famous explorer should meet his end in the field of a war waged in the interests of all humanity. Like Toppin (of the Peru-Bolivian boundary), who died at Mons, he never lived to reach his highest ideal. That ideal with Rawling was nothing less than the ascent of Everest, and who shall say that a man of his stout heart and magnificent physique would not have accomplished what many men have pronounced to be an impossibility?

The Royal Society announces that the King has approved of the award by the president and council of the society of a Royal medal to Dr. John Aitken, for his researches on cloudy condensations, and a Royal medal to Dr. Arthur Smith Woodward, for his researches in vertebrate palæontology. The following awards have also been made by the president and council:—The Copley medal to M. Emile Roux, for his services to bacteriology and as a pioneer in serum therapy; the Davy medal to M. Albin Haller, for his researches in the domain of organic chemistry; the Buchanan medal to Sir Almroth Wright, for his contributions to preventive medicine; and the Hughes medal to Prof. C. G. Barkla, for his researches in connection with X-ray radiation.

It has been decided to dissolve the Société Internationale de Chirurgie, and to form, after the war, a new society on the lines of the former one, but to be called the Société Interalliée de Chirurgie, the membership of which will be open not only to surgeons of the Allied countries, but also to those of neutral countries who shall be nominated for election by the general committee.

At the annual general meeting of the Cambridge Philosophical Society held on October 29 the following were elected officers of the society for the ensuing session:—*President*, Prof. Marr; *Vice-Presidents*, Prof. Newall, Dr. Doncaster, and Mr. W. H. Mills; *Treasurer*, Prof. Hobson; *Secretaries*, Mr. A. Wood, Mr. G. H. Hardy, and Mr. H. H. Brindley; *New Members of Council*, Sir J. Larmor, Prof. Eddington, and Dr. Marshall.

The council of the Institution of Civil Engineers has made the following awards for papers published in the Proceedings without discussion during the session 1916–17; A Watt gold medal to Major H. S. B. Whitley (Neath); Telford premiums to W. C. Popplewell (Manchester), H. Carrington (Woodley, Stockport), Dr. A. A. Stoddard (Bournemouth), A. E. L. Chorlton (Lincoln), and B. M. Samuelson (Rangoon); the Manby premium to R. Bleazby (Perth, W.A.); the Webb prize to J. B. Ball (London); and the Howard Quinquennial prize to Dr. W. C. Unwin.

At the anniversary meeting of the Mineralogical Society, held on November 6, the following were elected officers and ordinary members of council:—*President*, Mr. W. Barlow; *Vice-Presidents*, Prof. H. L. Bowman and Mr. A. Hutchinson; *Treasurer*, Sir William P. Beale, Bart.; *General Secretary*, Dr. G. T. Prior; *Foreign Secretary*, Prof. W. W. Watts; *Editor of the Journal*, Mr. L. J. Spencer; *Ordinary Members of Council*, Mr. T. V. Barker, Mr. G. Barrow, Prof. C. G. Cullis, Mr. F. P. Mennell, Mr. H. Collingridge, Mr. T. Crook, Dr. G. F. Herbert Smith, Dr. H. H. Thomas, Mr. H. F. Collins, Mr. J. P. De Castro, Prof. H. Hilton, and Lieut. Arthur Russell.

The programme of the one hundred and sixty-fourth session of the Royal Society of Arts, to be opened on Wednesday, November 21, shows that the society is continuing its valuable work for "the advancement, development, and practical application of every department of science in connection with the arts, manufactures, and commerce of this country." At the opening meeting an address will be delivered by Mr. Alan A. Campbell Swinton, chairman of the council, upon "Science and its Functions." At a later meeting the general aspects of the application of science to industry will form the subject of a lecture by Sir Dugald Clerk, and during the session leading authorities will deal with particular industries, such as those of sugar, rubber planting, cotton, timber, and the manufacture of margarine in Great Britain. Some of the papers to be read after Christmas are:—The relations between labour and capital, Lord Leverhulme; The war and its effects on the mind, Sir Robert Armstrong-Jones; Water-power in the British Isles, A. Newlands; Agricultural machinery, F. S. Courtney; and Organic chemistry in relation to industry, Dr. M. O. Forster. The Cantor lectures will include courses on progress in the metallurgy of copper; high-temperature processes and products; and military explosives of to-day.

The Postmaster-General, speaking at the Mansion House on November 12, said:—"It is intended, as soon as the military position will admit, to institute international aerial posts between London and the various principal capitals of Europe."

Mr. A. Adams, writing from Looe, Cornwall, records the occurrence in that county of the little owl (*Carine noctua*). A specimen was sent to him recently for identification by a rabbit-trapper in the neighbourhood, who had found it in a trap. In the *Zoologist*, in 1914, the little owl was recorded as breeding in Somerset; Mr. Adams's communication shows that it has extended its range westwards and southwards, as one would expect.

Mr. T. McKenna, chairman of the Executive Committee of the Decimal Association, informs us that at a recent joint meeting of the association with the Institute of Bankers and the Association of Chambers of Commerce unanimous agreement was secured as to the retention of the £ sterling as the monetary unit and its division into 1000 parts, or mils. This enables all the existing gold and silver coins down to and including the sixpenny-piece to be retained without any alteration in their respective values. For example the sixpence is represented exactly by 25 mils. In regard to the coins of lower denomination, it was unanimously agreed that they should consist of 1, 2, 3, 4, 5, and 10 mil pieces, of which the two latter would be of nickel. This enlarged range of the coins of lower value, in addition to providing coins substantially equal in value to the existing halfpenny and penny, would provide coins of intermediate value between the present halfpenny and penny, and thus overcome a defect in our present coinage which has resulted in prices in millions of small transactions in daily life being unduly increased because of the absence of suitable intermediate coins.

Owing to ill-health Dr. R. Hamlyn-Harris, director of the Queensland Museum, resigned his appointment on September 30. Referring to his retirement, the *Brisbane Courier* remarks that it will be a serious loss to the institution and to the cause of science in Queensland. It is about seven years since Dr. Hamlyn-Harris was appointed director, and in the intervening period he has laboured with enthusiasm and ability to make the museum an educational force in the community. He succeeded in making the museum both attractive to non-scientific visitors and a centre of student and scientific activity. He raised the scientific status of the institution, and reorganised the whole of the valuable collections, and the fine ethnological department of the museum owes a great deal to his knowledge, study, and enterprise.

The Admiralty has issued the following particulars of the unmanned, controlled high-speed craft to which we referred last week (p. 190):—The electrically controlled motor-boats used on the Belgian coast are twin petrol-engined vessels partially closed in, and travel at a high speed. They carry a drum with between thirty and fifty miles of insulated single-core cable, through which the boat is controlled electrically. The fore part carries a considerable charge of high explosive, probably from 300 lb. to 500 lb. in weight. The method of operating is to start the engine, after which the crew leave the boat. A seaplane, protected by a strong fighting patrol, then accompanies the vessel at a distance of three to five miles, and signals to the shore operator the helm to give the vessel. These signals need only be "starboard," "port," or "steady." The boat is zigzagged while running; this may be either intentional or unintentional. On being steered into a ship the charge is exploded automatically. The device is a very old one. A boat similarly controlled was used in H.M.S. *Vernon* (the torpedo experimental ship) so far back as 1885. The only new features in the German boats are petrol engines and wireless telegraphy signals, neither of which existed then.

The first report of the Conjoint Board of Scientific Societies shows that many subjects of national importance have engaged the attention of the board since it was constituted in June of last year. Forty-eight leading scientific and technical societies are represented upon the board, and the expenses are met by contributions from them. The receipts at the end of September last amounted to 652*l.* 6*s.* 8*d.*, the expenses to 270*l.* 12*s.* 3*d.*, and the balance at that date was 381*l.* 14*s.* 5*d.* There are ten sub-committees concerned respectively with the International Catalogue of Scientific Literature, the application of science to agriculture, technical optics, education, the prevention of overlapping among scientific societies, the metric system, anthropological survey, iron-ore, the water-power of the Empire, and timber for aeroplane construction. The Sub-committee on Agriculture emphatically believes that a great future awaits the development of electrical applications to agriculture in the United Kingdom. The board recommends, therefore, that the Board of Agriculture be asked to grant the necessary funds for designing, constructing, and testing practically an electrical tractor and certain other agricultural machines. The Sub-committee on Education, in conference with representatives of the Council of Humanistic Studies, has arrived at a reasonable statement as to the essential place of science in education. It has also communicated to Sir Joseph Thomson, for the use of the Government Committee on Science in the Educational System of Great Britain, two resolutions referring to the importance of training teachers to give inspiring and attractive courses in science, and the need for adequate salaries to be paid to such teachers. Dr. G. W. Walker having stated that in working on the magnetic survey of the country he had found evidence of disturbance in certain areas which he considered might be explained by the presence of iron ores, the board, upon the recommendation of the Iron-ore Sub-committee, has arranged for a detailed magnetic survey of (1) the neighbourhood of Melton Mowbray, and (2) that of Strachur and Lochgoilhead. The survey will be accompanied by (1) a detailed geological and petrological investigation of the rocks in each area, and (2) a determination of the magnetic permeability of the rocks and minerals occurring in each area. The report refers, among other matters, to the establishment of the Department of Scientific and Industrial Research, of the Department of Technical Optics at the Imperial College, and proposals by the British Association for the formation of a Geodetic Institute, with which the board has expressed itself entirely in sympathy.

Under the title of "Links between North and South," Prof. Flinders Petrie, in the October issue of *Man*, traces a connection between the Teutonic goddess Brynhild and Ishtar of Babylon. "The position seems to be that a warrior goddess, with lovers, but never married, who forced her way into hell, was an idea of a Central Asian people; that this was transformed into Ishtar by the peoples who pressed down in prehistoric days into Babylonia; that it was carried in some form westward by the Huns, and transformed into Brynhild by the Norse ethics and customs; and it was finally treated by the Germans much as Malory treated the Arthurian legends. Such are a few of the dim links between North and South which may some day serve to join up the two great streams of ancient history."

The second number of "Recalled to Life" was issued in October. It is a journal devoted to the care, re-education, and return to civil life of disabled sailors and soldiers, and contains valuable matter dealing with treatment and training and with administrative matters such as pensions. In the present number Col. Sir John Collie discusses neurasthenia and allied disorders, Major Horton-Smith Hartley deals with tuberculosis in its relation to the war, and Sir William Osler offers some remarks on the problem of the crippled.

The method of determining the surface tension of a liquid in air by allowing drops of the liquid to form slowly at the lower end of a thick-walled capillary tube and counting the number which fall off is so simple that it is very unfortunate that a satisfactory theory of the process has never been given. Lord Rayleigh showed that the mass m of the drop of a liquid of surface tension T which falls from a tube of outer radius r is given by $mg = \mathrm{CT}r$, where C is a constant which varies from 3·7 to 4·2, according to the properties of the liquid and the radius of the tube. The problem is a dynamical one, and its ultimate solution will be facilitated by the recent kinematograph pictures of the formation of falling drops which have been taken for M. F. L. Perrot, and are reproduced in his article on the subject in the *Revue générale des Sciences* for October 15. They show that the drop before it breaks away is connected to the liquid above it by a thin filament of considerable length, which breaks simultaneously in two places. We hope M. Perrot will succeed in placing the method on a sound basis.

The following works are in preparation for appearance in Messrs. Longmans and Co.'s *Monographs on Physiology*:—"The Physiology of Reflex Action," Prof. C. S. Sherrington; "The Physiological Basis of the Action of Drugs," Dr. H. H. Dale; "The Nature of Muscular Movement," Dr. W. M. Fletcher; "The Cerebral Mechanisms of Speech," Dr. F. W. Mott; "Tissue Respiration," Dr. C. Lovatt Evans; "The Physiology of Muscular Exercise," Prof. F. A. Bainbridge; and "The Vaso-Motor System," Prof. W. M. Bayliss.